Johns Peak quadrangle, in south-central Utah, was mapped by the U.S. Geological Survey as part of a project to classify and evaluate mineral lands in the public domain. The regional geology of the area was mapped previously and described by Lupton (1916) and Spieker (1931). Bituminous coal, sand and gravel, and ground water are known resources of economic interest within the quadrangle; oil and gas may occur at

Parts of the Wasatch Plateau and the Emery coal fields occur in this quadrangle. Coal of the Wasatch Plateau field, in its southernmost extent, disappears under a mantle of surficial deposits and Tertiary volcanic rocks in the southwestern part of the mapped area. The Emery field, in the eastern part of the quadrangle, extends a few miles south of the quadrangle before it, too, is covered by Tertiary volcanic

ECONOMIC GEOLOGY

Coal beds of economic thickness are found locally within the Upper Cretaceous Blackhawk Formation and in the Upper Cretaceous Ferron Sandstone Member of the Mancos Shale. The Blackhawk Formation contains the most laterally persistent coals. Thick coal beds occur only in the lower 150 ft of the Blackhawk, although thinner beds occur throughout the formation. The Ivie bed, which is the most persistent and probably the most economically important coal bed in the Blackhawk Formation, is generally 80-130 ft above the Star Point Sandstone (Upper Cretaceous) and overlies a 10-20-ft-thick bleached, white, massive Blackhawk sandstone that can be traced for many miles. The Ivie bed ranges in thickness from less than 1 ft to as much as 8.1 ft.

There are two other beds in the Blackhawk Formation that are locally thick enough to be of economic interest. The lowest, herein named the Last Chance Creek bed, overlies the Star Point Sandstone and is exposed along the north side of North Last Chance Creek in secs. 4 and 5, T. 25 S., R. 4 E. A bed at approximately the same horizon is exposed along the eastern margin of T. 24 S., R. 4 E., and may be the same bed. The Last Chance Creek bed ranges in thickness from 0.5 to 5.7 ft. The Upper Last Chance bed, about 25 ft above the Star Point Sandstone, also is exposed only along the north side of North Last Chance Creek in secs. 4 and 5, T. 25 S., R. 4 E., where it is as thick as 8.8 ft. Several other coal beds were found in drill holes (see sheet 2) but their correlation with coal beds observed in surface measured sections (sheet 2) is unknown owing to the complex intertonguing between the lower Blackhawk Formation and Star Point Sandstone. Intertonguing was observed in sec. 2, T. 24 S., R. 4 E., and probably occurs elsewhere but was difficult to recognize owing to the extensive cover of basaltic boulders and vegetation, which effectively obscure the bedrock. In addition, channeling of the Blackhawk Formation into the top of the Star Point Sandstone, removing as much as 50 ft of the Star Point Sandstone and replacing it with channel sandstones and other fluvial sediments, was observed in sec. 3, T. 24 S., R. 4 E., along Clear Creek.

Coal beds in the Ferron Sandstone Member of the Mancos Shale are much more lenticular. The best outcrops occur along the north side of Last Chance Creek in T. 25 S., R. 5 E. A coal bed at the top of the Ferron Sandstone Member, probably the M bed of Lupton (1916), is overlain by marine Mancos Shale and is highly gypsiferous. Farther west, the same bed is overlain by 10-30 ft of coarse, massive, and crossbedded sandstone and is known as the L bed of Lupton (1916). Several coal beds are at approximately the same horizon in the southeastern part of the quadrangle, near Paradise Valley, but their correlation with the bed at Last Chance Creek is difficult owing to the lenticularity of the coals. The bed (or beds) at Paradise Valley is herein called the Paradise Valley coal zone and the name is extended to the Last Chance Creek area to denote any bed of the horizon at or near the top of the Ferron Sandstone Member. This name would include the L and M beds of Lupton (1916). Locally, these beds are as thick as 6.9 ft but are extremely variable in thickness. A locally thick bed, herein called the Deer Peak bed, is about 200 ft above the base of the Ferron and is probably the A bed of Lupton (1916) but lies below the horizon of the Willow Springs bed in the Willow Springs quadrangle to the east. The Willow Springs bed is equivalent to the A bed of Lupton (1916) in the rest of the Emery coal field. The Deer Peak bed lies 20-25 ft above the lowermost marine sandstone unit of the Ferron and thins very rapidly to the south from the mouth of Last Chance Creek, but private drilling confirms the presence of a thick bed at this horizon to the west and southwest of the outcrop. At the mouth of Last Chance Creek, the bed is as thick as 5.9 ft.

According to Spieker (1931, p. 74), Blackhawk coals average 12,620 Btu/lb heating value, 6 percent moisture, 5.9 percent ash, 41.8 percent volatile matter, and 46.3 percent fixed carbon. Doelling (1972) sample from sec. 10 had 12.9 percent moisture, 37.2 percent volatile matter, 43.9 percent fixed carbon, 6.0 percent ash, 0.6 percent sulfur, and 10,600 Btu/1b heating value. The sample from sec. 3 had 13.9 percent moisture, 35.2 percent volatile matter, 43.6 percent fixed carbon, 7.3 percent ash, 0.6 percent sulfur, and 10,540 Btu/1b heating value. Doelling also showed one analysis of the A bed from sec. 9, T. 25 S., R. 5 E.: 11.9 percent moisture, 36.4 percent volatile matter, 42.7 percent fixed carbon, 9.0 percent ash, 0.53 percent sulfur, and 9,830 Btu/1b heating value.

There are no active mines in the quadrangle, although Doelling (1972) reported that several small mines and adits were operated in the past. The Ivie bed has been prospected along Clear Creek and in the northern part of the quadrangle. An unnamed bed of the Blackhawk Formation on the west side of Paradise Valley, in sec. 22, T. 25 S., R. 4 E., was mined during this century. An adit was opened in the early part of this century along Last Chance Creek in the upper part of the Ferron Sandstone Member (sec. 6, T. 25 S., R. 5 E.). About 1 mi north of the northern boundary of this quadrangle, in the Old Woman Plateau quadrangle, a mine was opened in 1977 on the Ivie bed.

Coal beds in the Blackhawk Formation are accessible only by underground mining methods because of the large amounts of overburden. Easy access to the coal is limited to two areas: (1) along Clear Creek about a mile south of Interstate Highway 70 (which is in Old Woman Plateau quadrangle to the north), and (2) along the north side of North Last Chance Creek about 6 mi south of Interstate Highway 70; access may require considerable road building.

Coal beds in the Ferron can be mined by both strip mining and underground methods. One area, in sec. 24, T. 25 S., R. 4 E., is particularly well suited for strip mining, having at least one bed 4 ft thick or more under a few tens of feet of overburden along a dip slope of the Ferron. Another area, in sec. 5, T. 25 S., R. 5 E., is also a dip slope of the Ferron; the remnants of the coal on this surface, however, might be severely weathered.

Extensive surficial deposits, such as pediments, could provide sand and gravel for local road and mine construction. Ubiquitous basalt boulders that cover almost the entire quadrangle could also be crushed to

Numerous springs have been developed for use by stock and wildlife. Ground water derived from sandstones in the Blackhawk Formation, Star Point Sandstone, and the Ferron Sandstone Member of the Mancos Shale could be used for stock and wildlife and possibly for coal mining.

STRUCTURE

Numerous faults were mapped in this quadrangle, the most extensive being the Paradise Valley-Joes Valley fault system. This zone of normal faulting trends north-northeast throughout most of the length of the Wasatch Plateau. The zone effectively separates the Emery coal field on the east from the Wasatch Plateau coal field on the west. Many other faults were mapped, most of which are subparallel to the trend of the Paradise Valley-Joes Valley system and the Musinia fault system to the west of the quadrangle. Some of the faults exhibit recent or renewed movement, as surficial deposits in some places are cut by the faults (see map). None of the prospective coal mine areas would be adversely affected by faulting. Two good examples of recent or renewed movement are in sec. 19. T. 24 S., R. 5 E., the NE% secs. 3 and 4, T. 25 S., R. 4 E., and sec. 33, T. 24 S., R. 4 E. In sec. 19, T. 24 S., R. 5 E., Quaternary alluvium and colluvium are displaced as much as 20 ft. In secs. 3 and 4, T. 25 S., R. 4 E., and sec. 33, T. 24 S., R. 4 E., Quaternary pediment deposits and colluvium are displaced as much as 40 ft.

A pair of folds, which were mapped east of the Paradise Valley-Joes Valley fault system, probably formed by movement along that system. The rocks are not severely deformed but the presence of dips 15° and more, locally, would adversely affect coal mining in sec. 5, T. 25 S., R. 5 E., especially near the trough of the northward plunging syncline along eastern edge of the section. For most of the Wasatch Plateau, the regional dip is to the west. Beds west of the Paradise Valley-Joes Valley fault system, however, generally dip to the north and northwest. According to Doelling (1972), this may be due to a structural high south of the quadrangle. South of North Last Chance Creek, where surficial deposits effectively mantle almost all the bedrock and information about the subsurface is scarce, the regional dip is assumed to be to the north or northwest.

SUBSURFACE INFORMATION

Two oil-and-gas tests have been drilled and abandoned in this area. Pacific Natural Gas 43-8 Paradise Lake, sec. 8, T. 25 S., R. 4 E., was drilled in 1964 to a total depth of 4,032 ft. The oldest formation drilled was the Lower Cretaceous Cedar Mountain Formation. Both the Ferron Sandstone Member of the Mancos Shale and the Dakota Sandstone were tested unsuccessfully. Colt Oil Inc. Paradise Lake unit 5-1A, sec. 5, T. 25 S., R. 4 E., was drilled in 1976 to a total depth of 4,121 ft. The oldest formation drilled was the Tununk Shale Member of the Mancos Shale. No cores or tests were done and this hole was also abandoned. Both of these drill holes are shown on cross-section B-B' accompanying the geologic map. The Ferron Sandstone Member, Dakota Sandstone, and the Cedar Mountain Formation are good potential sources of oil and gas. Several deeper formations are potential, yet untested, sources.

A total of 12 coal-test holes have been drilled: two core holes were drilled in 1975 by the Utah Geological and Mineralogical Survey for the USGS and 10 holes were drilled in 1977 by the USGS (Blanchard, 1978). Schematic sections of these holes are illustrated on sheet 2, showing thickness of coal, depth, important stratigraphic horizons, and correlations.

Sixteen proprietary holes were drilled by private companies in prospecting for Ferron coal east of the Paradise Valley-Joes Valley fault system. The results of this drilling are not shown because of their confidential nature; however, they were used for correlation and construction of structure contours.

STRATIGRAPHY

According to Spieker (1949), there are five members of the Mancos Shale in the Wasatch Plateau. They are, in ascending order, the Tununk Shale, Ferron Sandstone, Blue Gate Shale, Emery Sandstone, and Masuk Shale. According to Peterson and Ryder (1975, p. 171), each is a distinct mappable entity that probably should be considered a separate formation. However, there are problems with the nomenclature and correlations. The Ferron and the Emery Sandstone Members were named for exposures along the east side of the Wasatch Plateau and the shale members were named for exposures near the Henry Mountains, 30 mi southeast of the Wasatch

The Tununk Shale and the Ferron Sandstone Members in the Henry Mountains are probably equivalent to the same units in the Wasatch Plateau (Peterson and Ryder, 1975, p. 181). In the Henry Mountains region, the Ferron is separated from the Blue Gate by an unconformity that represents as many as six faunal zones. In the Wasatch Plateau, however, Cobban (1976) suggested that, at most, only two faunal zones may be missing.

The Blue Gate Shale Member was named for an exposure on Blue Gate Plateau. According to Peterson and Ryder (1975, p. 183), the Blue Gate Shale Member is represented in the Wasatch Plateau by the Blue Gate Shale, Emery Sandstone, and "Masuk" Shale Members (quotation marks denote doubtful terminology usage) They recommended that the Blue Gate Shale Member in the Wasatch Plateau be called the lower part of the Blue Gate Shale Member of the Mancos Shale and that the "Masuk" Shale Member be called the upper part of the Blue Gate Shale Member of the Mancos Shale. The "Emery" Sandstone Member in the Henry Mountains, lying directly on top of the Blue Gate Shale Member, is not correlative with the type Emery in the Wasatch Plateau but is correlative with the Star Point Sandstone and part of the Blackhawk Formation. The Masuk Member of the Mancos Shale, in the Henry Mountains, is correlative not with the "Masuk" Shale Member in the Wasatch Plateau, but with part of the Blackhawk Formation. Figure 1 shows this relationship.

According to Petersom and Ryder (1975, p. 184) there are two reasons for this miscorrelation. The first reason is that the units were correlated on the basis of similar thickness. However, it has been demonstrated (Spieker, 1949) that most of the Upper Cretaceous units thicken considerably to the west, thus invalidating any correlation based strictly on similar thicknesses. The second reason is that the Masuk Member in the Henry Mountains was thought to be marine and thereby similar to the marine "Masuk" in the Wasatch Plateau. The Masuk Member in the Henry Mountains is now believed to be continental in origin and is correlated with part of the Blackhawk Formation.

The map units of the Mancos Shale used in this report (in ascending order, Tununk Shale, Ferron Sandstone lower part of the Blue Gate Shale, Emery Sandstone, and upper part of the Blue Gate Shale Members) follow the recommendations for the Wasatch Plateau of Peterson and Ryder (1975, p. 184)

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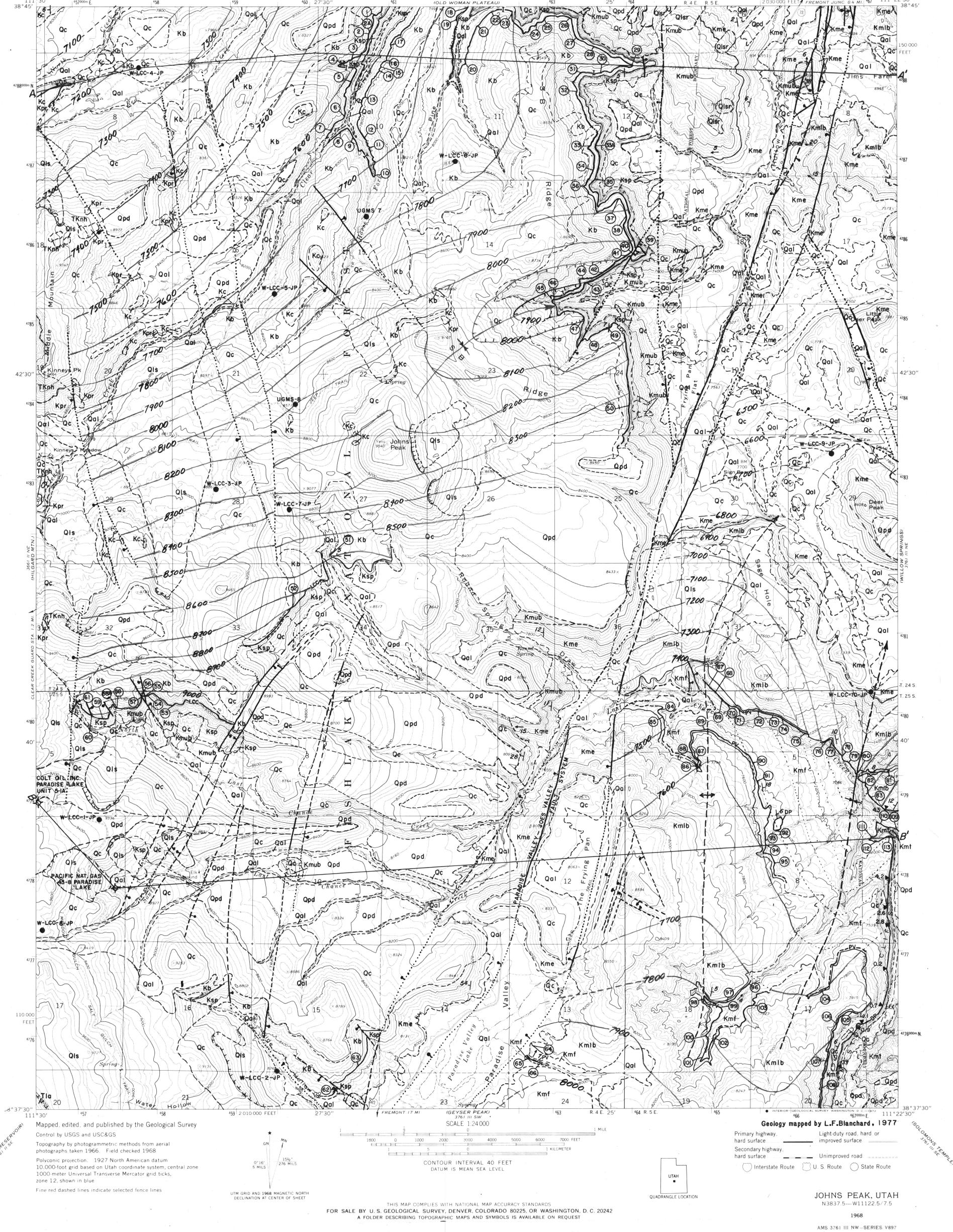
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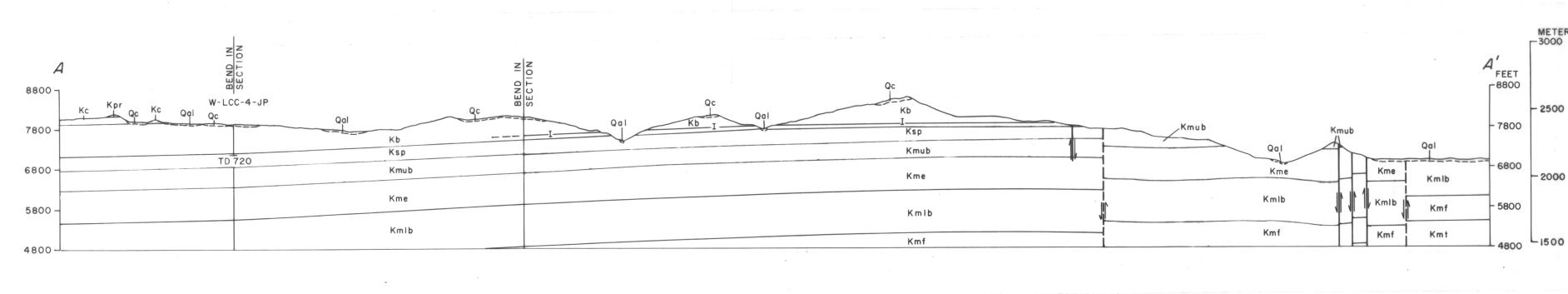
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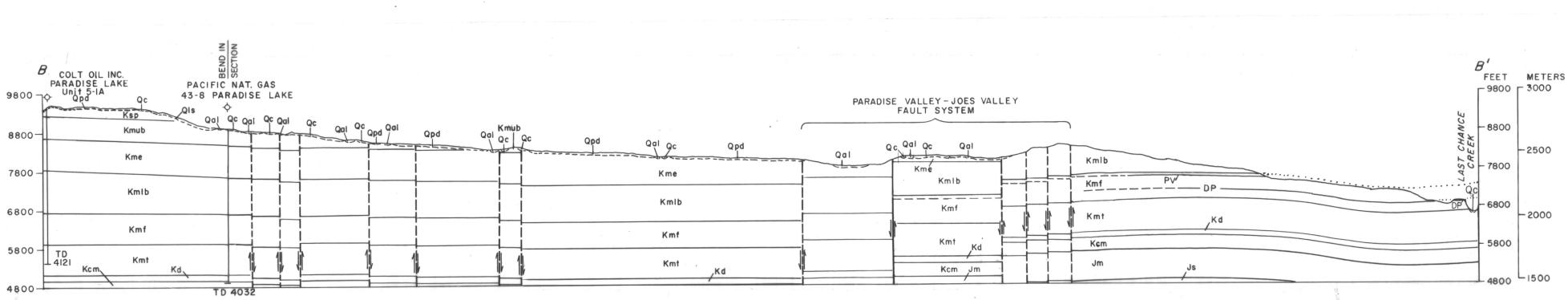
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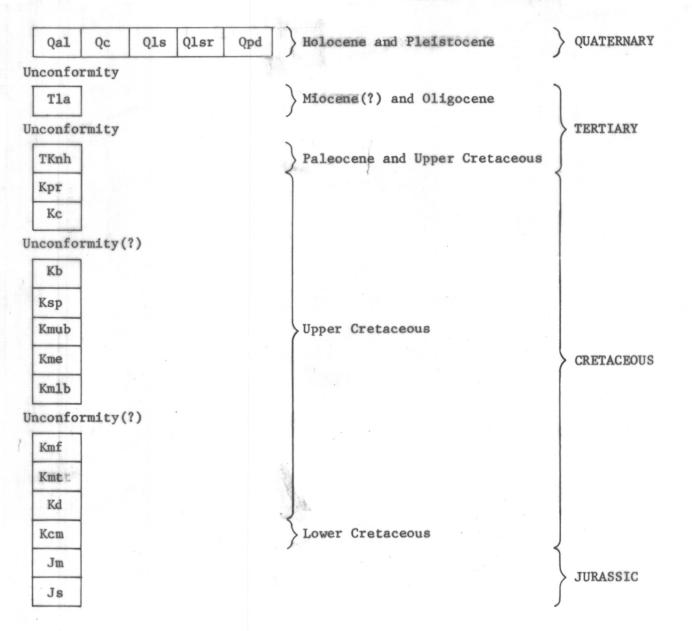


GEOLOGIC MAP AND COAL SECTIONS OF JOHNS PEAK QUADRANGLE, SEVIER COUNTY, UTAH

L.F. Blanchard

1980

CORRELATION OF MAP UNITS



UTAH-SEVIER CO.

DESCRIPTION OF MAP UNITS

ALLUVIUM (HOLOCENE AND PLEISTOCENE) -- Unconsolidated deposits of clay, silt, sand, and gravel along

COLLUVIUM (HOLOCENE AND PLEISTOCENE) -- Unconsolidated deposits of clay, silt, sand, and gravel. Pebbles, cobbles, and boulders of basalt and other extrusive igneous rocks cover the bedrock

LANDSLIDE DEPOSIT (HOLOCENE AND PLEISTOCENE) -- Unconsolidated clay, silt, sand, gravel, boulders,

ROTATIONAL LANDSLIDE DEPOSIT (HOLOCENE AND PLEISTOCENE) -- Displaced mass of bedrock rotated backwards as shearing and downslope mass movement took place. Dips are anomalously high, as much as 50°. Mass of bedrock highly fractured but intact in stratigraphic relationships

PEDIMENT DEPOSITS (HOLOCENE AND PLEISTOCENE) -- Unconsolidated to poorly consolidated, poorly sorted sand and gravel capping surface in the western and southwestern parts of the quadrangle. The cobbles and boulders are rounded and consist mostly of very resistant basalt and other extrusive igneous rocks; angular chert fragments are common on most surfaces. Less common are rounded

LATITE AND BASALTIC ANDESITE FLOWS, UNDIFFERENTIATED (MIOCENE? AND OLIGOCENE) -- May belong to Bullion

NORTH HORN FORMATION (PALEOCENE AND UPPER CRETACEOUS) -- Mudstone, shale, siltstone, conglomeratic sandstone, and thin, freshwater limestone; predominantly red to tan and variegated. Very poorly exposed in the quadrangle. About 1,200 ft thick PRICE RIVER FORMATION (UPPER CRETACEOUS) -- Gray to tan fluvial sandstone, partly conglomeratic,

interbedded with gray shale and sparse carbonaceous shale and very thin coal beds. About 700 ft

CASTLEGATE SANDSTONE (UPPER CRETACEOUS) -- Tan to brown to gray, coarse-grained to massive, cliffforming, conglomeratic fluvial sandstone, claystone and shale: upper part, tan and gray conglomeratic sandstone, 50-250 ft thick; middle part, gray and brown claystone and shale, 100-200 ft thick; lower part, predominantly tan sandstone, 0-50 ft thick. Total thickness

BLACKHAWK FORMATION (UPPER CRETACEOUS) -- Buff, gray, orange, and white, fine- to medium-grained sandstone of fluvial and marginal marine origin interbedded with gray shale, siltstone, mudstone, carbonaceous shale and coal. Thick, economic coal beds occur only in the lower 150 ft. Inter-

tongues with and channels into the Star Point Sandstone below. From 700 to 800 ft thick STAR POINT SANDSTONE (UPPER CRETACEOUS) -- Gray, tan, and white, massive- to thin-bedded, near-shore, marine sandstone with interbedded dark-gray shales and siltstones that are tongues of the upper part of the Blue Gate Member of the Mancos Shale. Massive cliff-former. From 350 to 400 ft

MANCOS SHALE (UPPER CRETACEOUS) -- Dark- to light-gray marine shale and siltstone, and yellow, brown, and orange, very fine grained to medium-grained sandstone. About 4,100 ft thick Upper part of Blue Gate Shale Member--Gray, silty, marine shale, gray siltstone, and gray, very fine grained sandstone. About 450 ft thick

Emery Sandstone Member--Yellow to gray, thin- to thick-bedded, with interbedded gray shale and siltstone. About 800 ft thick

Lower part of Blue Gate Shale Member -- Dark-gray shale with minor thin, yellow to tan, finegrained sandstone beds. From 900 to 1,600 ft thick

Ferron Sandstone Member--Tan, orange, and brown, fine- to coarse-grained, commonly crossbedded and lenticular deltaic sandstone interbedded with gray shale, mudstone, siltstone, carbonaceous shale, and coal. From 700 to 800 ft thick Tununk Shale Member--Very dark gray, marine shale interbedded with a few thin beds of very fine

grained yellow sandstone and siltstone. About 800 ft thick DAKOTA SANDSTONE (UPPER CRETACEOUS) -- Shown in section only

CEDAR MOUNTAIN FORMATION (LOWER CRETACEOUS) -- Shown in section only

MORRISON FORMATION (JURASSIC) -- Shown in section only

SUMMERVILLE FORMATION (JURASSIC) -- Shown in section only

COAL BED--Dashed where approximately located; dotted where concealed. Thickness of coal, in feet, measured at triangle. Circled number refers to location of measured coal section. Letter represents name of coal bed: I (Ivie bed) and LCC (Last Chance Creek bed, including Upper Last Chance bed where present) of Blackhawk Formation; DP (Deer Peak bed and PV (Paradise Valley coal zone) in Ferron Sandstone Member of Mancos Shale

LANDSLIDE SCARP--Hachures point in direction of movement

FAULT--Dashed where approximately located; dotted where concealed. Bar and ball on downthrown side FOLDS--Showing direction of plunge; dashed where approximately located

-8000- STRUCTURE CONTOURS--Drawn on top of Star Point Sandstone west of Paradise Valley-Joes Valley fault system, and on top of Ferron Sandstone Member of the Mancos Shale east of Paradise Valley-Joes Valley fault system. Dotted where projected over land surface; contour interval 100 ft. Hachures STRIKE AND DIP OF BEDS

APPARENT DIP OF BEDS

ABANDONED COAL MINE

ABANDONED OIL AND GAS TEST HOLE--Showing operator and lease name U.S. GEOLOGICAL SURVEY COAL DRILL HOLE, 1977

W-LCC-6-JP

U.S. GEOLOGICAL SURVEY COAL DRILL HOLE, 1975

1 foot = 0.3048 meter1 mile = 1.6093 kilometers

This report has not been edited for conformity with U.S. Geological Survey editorial standards.

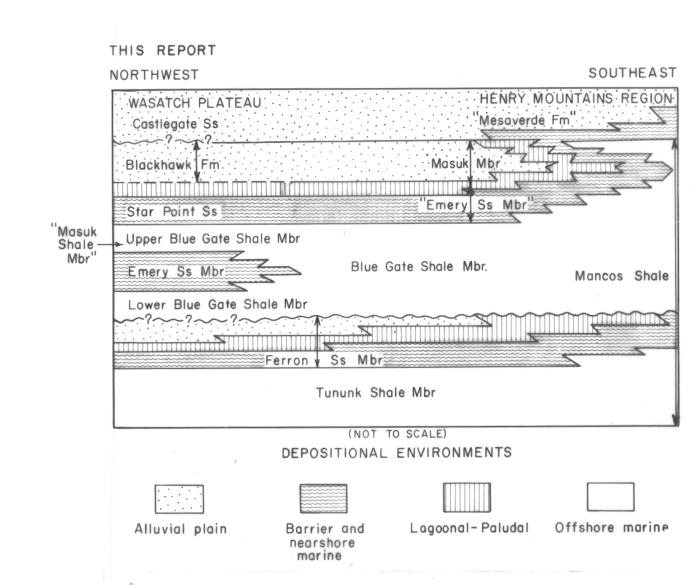


Figure 1.--Diagrammatic restored section from the Wasatch Plateau to the Henry Mountain region, showing depositional environments and correlation of units. Names in quotation marks are considered improperly used. Adapted from Peterson and Ryder (1975, fig. 6, p. 183).